TM-11-6625-522-14-2

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, AND GENERAL SUPPORT

MAINTENANCE MANUAL

FOR

# TEST OSCILLATOR

# BC-376P

# (FSN 6625-098-3668)

HEADQUARTERS, DEPARTMENT OF THE ARMY

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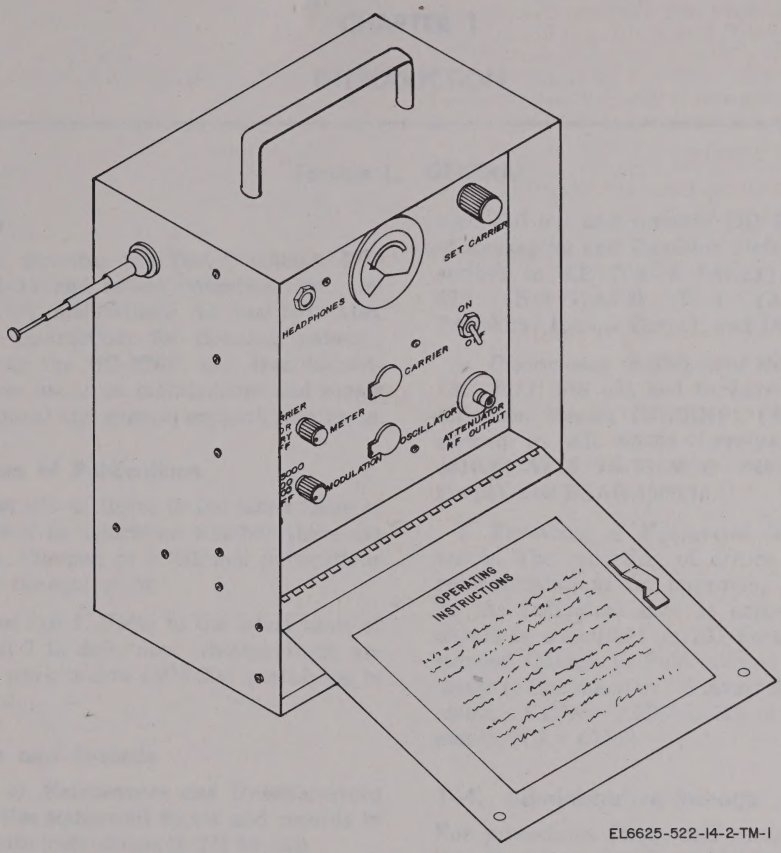



*Figure 1-1. Test Oscillator, BC-376P.*

# CHAPTER 1

# INTRODUCTION

## Section I. GENERAL

### 1-1. Scope

This manual describes the Test Oscillator, BC-376P (fig. 1-1) and covers operation, use, and instructions for maintaining the test set. Also, included are instructions for cleaning, painting and inspecting the BC-376P, and troubleshooting procedures useful in maintenance and repair by organizational and general support repairmen.

### 1-2. Indexes of Publications

*a. DA Pam 310-4.* Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

*b. DA Pam 310-7.* Refer to the latest issue of DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

### 1-3. Forms and Records

*a. Report of Maintenance and Unsatisfactory Equipment.* Use equipment forms and records in accordance with instructions in TM 38-750.

*b. Report of Packaging and Handling Deficiencies.* Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army)/NAVSUP Pub 378 (Navy)/AFM 71-4 (Air Force)/MCO P4030.29 (Marine Corps), and DSAR 4145.8.

*c. Discrepancy in Shipment Report (DISREP) (SF 361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38 (Army)/NAVSUPINST 4610.33/AFM 75-18/MCO P4610.19A (Marine Corps), and DSAR 4500.15.

*d. Reporting of Equipment Manual Improvements.* The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DD Form 2028 (Recommended Change to Publications) and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-AN, Fort Monmouth, N.J. 07703.

### 1-4. Administrative Storage

For procedures forms and records, and inspections required during administrative storage of this equipment, refer to TM 740-90-1.

## Section II. DESCRIPTION AND DATA

### 1-5. Purpose and Use

The BC-376P is a portable, low-power, high frequency multipurpose test oscillator used to adjust and tune marker beacon transmitters and receivers either on the test bench or installed in the aircraft. Test Oscillator BC-376P may function as a low-power transmitter, a signal generator or a heterodyne frequency meter.

*a.* As a low-power transmitter, it radiates a horizontally polarized reference signal, optionally modulated, to which marker beacon receivers can be aligned.

*b.* As a signal generator, it provides a calibrated output signal, optionally modulated, to marker beacon receivers under test.

*c.* As a heterodyne frequency meter, it mixes its local frequency with a marker beacon transmitter output to produce an aural tuning indication.

*d.* The test set is equipped with a carrying handle and two snap fasteners that secure the cover to the test set case. Operating power is obtained from one self-contained BA-36/U battery.

*e.* All controls required to operate the test set are on the front panel.

## 1–6. Differences Between Models

The BC–376P is a new model of this test oscillator and bears only outward dimensional and functional resemblances to the earlier models. This technical manual is for only the BC–376P and should be used for no other model.

## 1–7. Technical Characteristics

| | *Enblish* | *Metric* |
|---|---|---|
| Weight | 17.5 lbs. | 8 kg |
| Overall Dimensions: | | |
| Height | 12 in. | 30.5cm |
| Width | 9 in. | 22.9cm |
| Depth | 5 7/8 deep | 14.9cm |

## 1–8. Items Comprising an Operable Equipment

| *Qty.* | *Item* | *Designation* |
|---|---|---|
| 1 | Test Oscillator | BC–376P |
| 1 | Battery | BA–36/U |
| 1 | Headset | HS–23 or equivalent |
| 1 | Rf Cable Assembly | CG–409A/U |
| 1 | Fuse, F1, 1/4 amp, 250v | F03B250V 1/4A |
| 1 | Fuse, F2, 1/16 amp, 250v | F03B250V 1/16A |

# CHAPTER 2

# SERVICE UPON RECEIPT AND INSTALLATION

## 2–1. Unpacking

There are no special unpacking procedures to be followed. Figure 2–1 illustrates packaging of the BC–376P.

## 2–2. Checking Unpacked Equipment

*a.* Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6.

*b.* Check the equipment against the component listing in the operators manual and the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of TM 38–750. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.

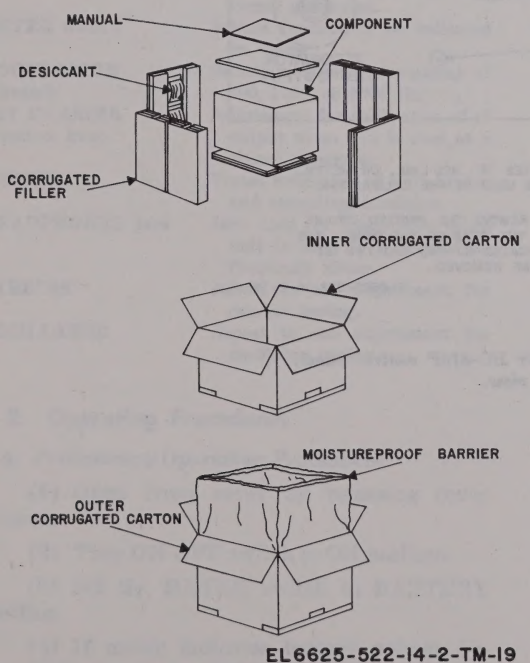



*Figure 2–1. Packing Diagram.*

*c.* Check to see whether the equipment has been modified. (Equipment which has been modified will have the MWO number on the front panel, near the nomenclature plate.) Check also to see whether all currently applicable MWO have been applied. (Current MWO's applicable to the equipment are listed in DA Pam 310–7.)

## 2–3. Tools, Test Equipment and Materials Required for Installation

One #1 or #2 Phillips screwdriver is needed for placing the equipment in operation. Special tools and test equipment are listed in Appendix B and TM 11–6625–522–24P.

## 2–4. Preparation for Use

The BC–376P is a portable, battery operated, test oscillator. Use the following procedures to install a Battery BA–36/U in the lower (battery) compartment. Fuses F1 and F2 are clip mounted to the printed circuit board and are to be replaced by organizational maintenance personnel or higher (para 5–7).

*a.* Unlatch slide snap fasteners.

*b.* Remove the two lower screws on each side of the battery compartment, as shown in figure 5–1.

*c.* Slide battery compartment out and insert battery making certain the battery terminals clear the sides of the compartment.

*d.* Attach power cable to battery terminals, with the + and − symbol on the power cable terminal board to the battery as shown in figure 4–1.

**NOTE**

Unit will not operate if polarity is reversed.

*e.* Replace battery compartment in case.

*f.* SET ON-OFF switch to ON position.

*g.* Turn METER switch to BATTERY position.

*h.* Meter must indicate voltage above 17.5 volts. If battery voltage is below 17.5 volts refer to paragraph 3–4*a*(4).

*i.* Turn METER switch to CARRIER position.

*j.* Rotate SET CARRIER knob so the meter reads at SET CARRIER position. This is the red line in the center of the meter scale.

*k.* Replace the four screws that attach the battery compartment to case.

*l.* Test oscillator is now ready for operation.

*m.* Relatch front cover.

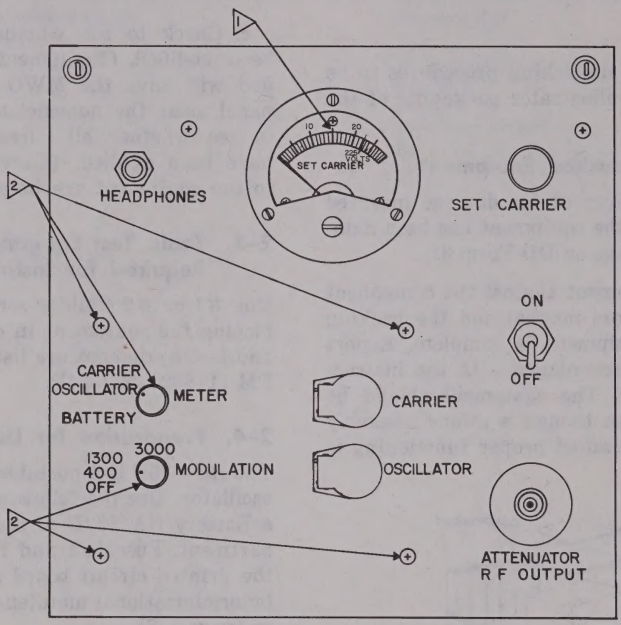



*Figure 2–2. Test Oscillator BC–376P control panel, front view.*

# CHAPTER 3

# OPERATING INSTRUCTIONS

## Section I. OPERATION UNDER USUAL CONDITIONS

### 3-1. Controls and Instruments

*a. Damage from Improper Settings.* No damage to the equipment or personnel hazard can occur from improper control settings.

*b. Operator's Controls.*

(fig. 2-2)

| *Control or Instrument* | *Function* |
|---|---|
| ON-OFF Switch | Main power control switch. |
| ATTENUATOR RF OUTPUT | Rf output jack mounted on plunger-action attenuator to provide calibrated output amplitude adjustment. Operated when unit is used as a signal generator. |
| METER Switch | Selects function to be indicated on meter. |
| MODULATION Switch | Selects modulation frequency of 400, 1300, or 3000 Hz. |
| SET CARRIER control knob | Adjustment for calibration of rf output when unit is used as a signal generator. |
| METER | Visual indication of unit tuning and operating condition. |
| HEADPHONES jack | Jack used for headphones when unit is used as a heterodyne frequency meter. |
| CARRIER | Access to coil adjustment for carrier tuning. |
| OSCILLATOR | Access to coil adjustment for oscillator tuning. |

### 3-2. Operating Procedures

*a. Preliminary Operating Procedures*

(1) Open front cover by releasing cover latches.

(2) Turn ON-OFF switch to ON position.

(3) Set the METER switch to BATTERY position.

(4) If meter indicates battery voltage below 17.5 volts, open battery compartment and attach power cable terminal board to battery with negative symbol on 22.5v post and positive symbol on 45 volt post. If meter still indicates battery voltage below 17.5 volts, turn power switch OFF and replace battery (para 2-4). Check to see that new battery voltage is above 17.5 volts.

(5) Extend telescope antenna.

(6) Set METER switch to CARRIER position.

(7) Turn SET CARRIER knob until meter needle rests at the SET CARRIER mark.

*b. Operation as a transmitter*

(1) Set the MODULATION switch to desired modulating frequency: 400, 1300, or 3000-Hz.

(2) Adjust orientation of test oscillator for maximum signal strength at the receiver to be tested.

*c. Operation as a heterodyne frequency meter*

(1) Set modulation switch to OFF position.

(2) Set METER switch to OFF position.

(3) Plug high impedence headphones into HEADPHONES jack.

(4) Tune transmitter under test until audio tone is heard and then tune for zero beat.

*d. Operation as a signal generator.*

(1) Set MODULATION switch to desired modulating frequency.

(2) Connect rf cable to ATTENUATOR jack.

(3) Adjust ATTENUATOR signal level by pulling plunger forward until desired signal level (as marked on barrel in microvolts) is visible (fig. 3-1).

*e. Shut down procedure.* Place ON-OFF switch in OFF position, and remove cables and headphones.

NOTE

To conserve battery, be sure equipment is off when it is not being used.

### 3-3. Preparation for Movement

*a.* Telescope antenna back into case.

*b.* Close and latch front cover.

*c.* Remove battery if the BC-376P is to be stored for more than 30 days.

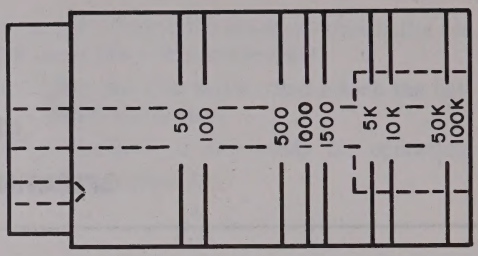



*Figure 3-1. Attenuator AT1 Plunger Markings.*

## Section II. OPERATION UNDER UNUSUAL CONDITIONS

### 3-4. General

The operation of Test Oscillator, BC-376P may be difficult or pose unusual problems in regions where extreme heat or cold, humidity and moisture, sand conditions, etc, prevail. The recommended procedures to minimize the effect of unusual environmental conditions are given in the paragraphs that follow.

### 3-5. Operation in Arctic Climates

Subzero temperatures and climatic conditions associated with cold weather can affect operation of the test set. Instructions and precautions for operation under such adverse conditions include:

*a.* Keep the equipment warm and dry as much as possible. Stow the test set in a heated enclosure until it is to be used in man-portable operation.

*b.* Batteries should be protected from freezing as much as possible. Batteries should not be installed in the equipment until just before use.

*c.* If the test set has been exposed to the cold and is then brought into a warm room, moisture will gather on the equipment. When the test set reaches room temperature, dry it thoroughly.

### 3-6. Operation in Tropical or High Temperature Climates

High temperature and humidity conditions can affect the BC-376P and the batteries. To minimize these effects, follow the precautions given in *a* and *b* below:

*a.* Remove batteries from the test oscillator whenever it is not being used in the man-portable operation to minimize corrosion of battery compartment and battery connectors. Keep battery compartment closed as much as possible to keep sand and dust from working into it.

*b.* High humidity can cause condensation of moisture within the test oscillator case. To minimize internal moisture condensation, keep the test oscillator in a location where forced air ventilation exists.

# CHAPTER 4

# OPERATOR MAINTENANCE INSTRUCTIONS

## 4–1. Operator's Preventive Maintenance

To insure the BC–376P is always ready for operation, it must be inspected systematically so defects may be discovered and corrected before resulting in serious damage or failure. The preventive maintenance checks and services to be performed are listed and described in *a* and *b* below. The item numbers indicate the sequence of and minimum inspection required. Defects discovered during operation of the unit will be noted so that they may be corrected as soon as operation has ceased. Stop operation if a deficiency is noted which will yield improper results or cause damage to the equipment under test. Record all deficiencies together with the corrective action taken as indicated in TM 38–750. Instructions for performing the required checks are identified as periodic checks.

*a. Operators Daily Preventive Maintenance Checks and Services Chart.*

| *Sequence Number* | *Item* | *Procedure* | *Ref.* |
|---|---|---|---|
| 1 | Test Set | Check equipment for completeness and general condition. | |
| 2 | Exterior Surfaces | Clean exterior surfaces of the equipment. | Paragraph 4–2 |
| 3 | External Receptacles | Inspect rf receptacle for breakage and looseness. | |
| 4 | METER face | Inspect front panel meter face for damaged housing, broken face, physical damage, dust or moisture. | |
| 5 | Knobs, Controls and Switches | Check knobs, controls, and switches for proper mechanical action. Action must be positive, without backlash, binding or scraping. | |
| 6 | Operation | During operation, be alert for any abnormal indications. | |
| 7 | Battery | Check battery voltage to be sure it is above its lower limit. | Paragraph 2–6 |

*b. Operators Weekly Preventive Maintenance Checks and Services Chart.*

| *Sequence Number* | *Item* | *Procedure* | *Ref.* |
|---|---|---|---|
| 1 | Hardware | Inspect all exterior hardware for looseness and damage. The test set cover, carry handle, latches, and all bolts and screws must be tight and not damaged. | |
| 2 | Preservation | Inspect equipment for bare spots, rust, and corrosion. If these conditions exist refer to organizational level maintenance for repair. | |
| 3 | Batteries | Inspect batteries for leakage, corrosion, and swelling. | |

## 4–2. Cleaning

Inspect the exterior surface of the test set. The exterior surface should be free of dirt, grease and fungus.

*a.* Remove dust and other loose dirt with a clean, soft cloth.

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. DO NOT USE NEAR AN OPEN FLAME. Trichlroethane is not flammable, but exposure of the fumes to an open

flame or hot metal surface converts the fumes to highly toxic phosgene gas.

*b.* Remove grease, fungus, and ground-in dirt from the cases; use a cloth dampened (not wet) with trichloroethane.

*c.* Remove dirt from plugs and jacks with a brush.

**CAUTION**

DO NOT press on meter face or let the trichloroethane contact the meter face when cleaning; the meter or face may become damaged.

*d.* Clean the front panel, meter, and control knobs, using a soft clean cloth. If necessary, dampen the cloth with water; mild soap may be used for more effective cleaning.

## 4-3. Malfunctions

*a.* The most prevalent malfunction is battery failure. Since this test oscillator is designed to operate from only one section of the battery at a time, the connector can be shifted to the other set of posts (figure 4-1) to provide an essentially new or spare battery. Do not follow this procedure if any signs of corrosion, swelling or other signs of total battery failure exist.

**NOTE**

The plus terminal on the battery cable terminal board should be connected to the higher voltage value used. If the 0 and +22½ voltterminal of the battery are being used, the plus terminal should go to the +22½ volt post on the battery, and the negative terminal should go to the 0 post on the battery. If the 22½ volt and +45 volt posts on the battery are being used, the plus on the battery cable terminal board should go to the +45 volt post on the battery, and the negative on the terminal board should go to the +22½ volts post on the battery.

*b.* Any malfunction that is beyond the scope of the operator to correct shall be referred to organizational maintenance.

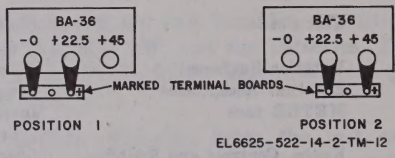



*Figure 4-1. Battery terminals.*

# CHAPTER 5

# ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

## Section I. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

### 5-1. General

Organizational preventive maintenance is performed monthly. It is in addition to, and includes, the preventive maintenance performed by the operator on a daily and weekly basis as described in paragraph 4-1. The necessary preventive maintenance checks and services to be performed are listed and described in paragraph 5-2. Defects discovered during operation of the unit will be noted for correction to be made as soon as operation has ceased. Stop operation if a deficiency is noted during operation which would damage the equipment. Record all deficiencies together with the corrective action taken as indicated in TM 38-750.

### 5-2. Organizational Monthly Preventive Maintenance Checks and Services

| *Sequence Number* | *Item* | *Procedure* | *Ref.* |
|---|---|---|---|
| 1 | Publications | Inspect the manual for completeness and usable condition. Be sure that all changes to the manual are on hand. | DA Pam. 310-4 |
| 2 | Modification Work Orders | Check to see that all URGENT MWO's have been applied and that all NORMAL MWO's have been scheduled. | DA Pam. 310-7 |
| 3 | Completeness | Check the equipment for completeness and general condition. | |
| 4 | Operation | During operation, be alert for any abnormal indication. | |

### 5-3. Rustproofing, Repainting and Retouching

The BC-376P shall be repainted, refinished, or retouched using the type and color of paint and the specific procedures in MIL-T-21200. Use the applicable section for ground support equipment to be used on the flight line. Refer to TB 746-10 (Field Instructions for Painting and Preserving Electronics Command Equipment). Only surfaces that have been previously painted shall be repainted.

*a. Rustproofing.* When the finish on the test set has become badly scarred or damaged, rust and corrosion can be prevented by touching up the bare spots. Use no. 000 sandpaper to clean the surface down to the bare metal. Obtain a bright, smooth finish.

*b. Repainting.* Brush two thin coats of paint on the bare metal to protect it.

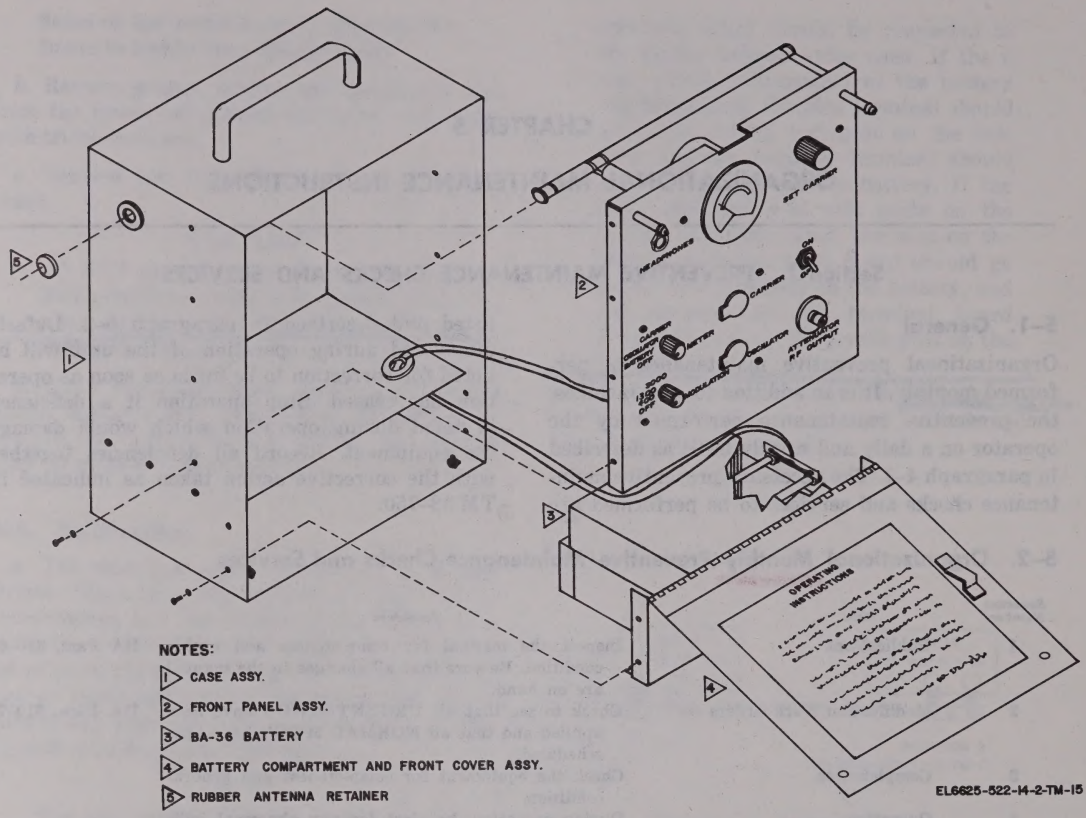



*Figure 5-1. Test Oscillator BC-376P, exploded view.*

## Section II. TROUBLESHOOTING

### 5-4. Troubleshooting Techniques

*a. General.* The first procedure in servicing a defective test set is to sectionalize the fault. Sectionalization consists of tracing the fault to a circuit concerned with one function. Once the defective function is found, isolation of the defective part is accomplished. Troubleshooting is performed by general support and depot repairmen.

*b. Sectionalization.* Listed in (1) and (2) below is a group of tests that are arranged to help locate the defect to a faulty component.

(1) *Visual inspection.* When the test set is brought in for repair, remove the front panel (para 5-7) and inspect as follows:

*a.* Check to see that all connections are properly seated. Repair or replace any connections or leads that are broken or otherwise defective.

(*b*) Check all switches and controls for ease of operation.

(*c*) Remove the battery compartment and check for corrosion or loose battery terminals.

(*d*) Inspect for loose or missing screws, specifically those that fasten the printed circuit board to the front panel.

(2) *Operational tests.* Operational tests frequently indicate the general location of trouble. In many instances, the twst will determine the exact nature of the fault. Organizational maintenance Tuning and Adjustment Procedures (para 5-8) provide a good operational test.

*c. Troubleshooting chart and equipment required.* The meter indications or lack of meter

indication, and operational checks provide a systematic method of localizing trouble to the faulty circuit. The trouble symptoms listed in the troubleshooting chart provide additional information for localizing troubles. Any malfunction that is beyond the scope of organizational maintenance to correct shall be referred to general support maintenance.

## 5–5. Organizational Maintenance Troubleshooting Procedures

| *Symptom* | *Probable Cause* | *Corrective Measure* |
|---|---|---|
| *1* Meter does not show any deflection on any setting. | Meter fuse, F2, blown. Power fuse, F1, blown. | Replace fuse F2 or F1 (para. 5–7). |
| *2* Meter pointer indicates less than 17.5 volts when function switch is in BATTERY position. | Battery low, or connection loose, fuse F1 blown. | Check battery, replace if necessary, check and replace fuse F1. |
| *3* Meter pointer will not adjust to SET CARRIER position. | Tuning not correct. | Retune as described in paragraph 5–8. |

## Section III. MAINTENANCE OF TEST OSCILLATOR BC–376P

**NOTE**

If the following maintenance procedures fail to correct the difficulty, the faulty unit along with a complete description of the observed difficulty and the maintenance procedures used should be referred to General Support maintenance.

### 5–6. Battery Maintenance

*a. Removal.* Remove the battery from the case as described in paragraph 2–4 of this manual.

*b. Inspection.* Inspect the battery for signs of leakage, swelling or corrosion. If no corrosion exists, test the unit with the battery connector attached to the two terminals not in use. Use battery in this position if battery voltage reads above 17.5 volts.

*c. Clean.* Clean all corrosion and leakage products from the battery compartment with a cloth dampened in trichloroethane before replacing battery in compartment.

**WARNING**

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. DO NOT USE NEAR AN OPEN FLAME. Trichloroethane is not flammable, but exposure of the fumes to an open flame or hot metal surface forms highly toxic phosgene gas.

*d. Assembly.* Assemble the battery compartment in the reverse order to that of paragraph 2–4.

### 5–7. Front Panel and Printed Circuit Board Removal and Replacement

*a. Disassembly.*

(1) Remove rubber retainer from antenna, item 5 of figure 5–1, by unscrewing ball tip from antenna. After removing rubber retainer replace ball tip on antenna.

(2) Push antenna tip completely into case.

(3) Remove the upper four Phillips head screws, on each side of case, that attach the front panel to the case. Carefully slide front panel away from case.

(4) While holding the front panel to prevent strain on the battery conductors, remove the two selector switch knobs.

(5) Remove the four screws that attach the circuit board to the front panel (figure 7–3).

(6) Refer to figure 7–1 for location of fuses.

(*a*) Two fuses (F1) and (F2) with spares held in fuse holders, are mounted on the component side of the printed circuit board. The fuses cannot be removed without first removing the printed circuit board.

(*b*) The printed circuit board is located behind and mounted to the front panel. Removal of front panel and printed circuit board is required for replacement of fuses.

*b. Assembly.*

**CAUTION**

The coil forms extending from the component side of the circuit board are easily damaged when attaching the cir-

cuit board to the front panel. BE VERY CAREFUL WHEN PLACING THE CIRCUIT BOARD AGAINST THE FRONT PANEL. Make sure the coil forms fit inside the tuning cover bushings as the board is positioned against the front panel.

(1) Place the circuit board so that the selector switch shafts fit through their respective holes and the coil-forms fit into the bushings of the tuning covers.

(2) Start all four screws that attach the circuit board to the front panel.

(3) Realign the coil-forms and the switch shafts with their respective holes and then carefully tighten the four screws.

(4) Reattach the meter and modulation selector switch knobs in their proper positions.

(5) Twist one end of an eighteen inch-long piece of #22 AWG wire around the end of the antenna.

(6) Pass the other end of this wire through the antenna grommet in the left side of the case.

(7) Place the front panel in position to insert attachment screws, being careful not to bind the wire attached to the antenna.

(8) Start the eight screws that attach the front panel to the case.

(9) Gently but firmly pull on the end of the wire protruding from the antenna grommet, drawing the end of the antenna through the hole.

(10) Tighten all screws attaching the front panel to the case.

(11) Replace the rubber retainer on the antenna.

(12) Remove the wire from the antenna.

### 5-8. Tuning and Adjustment Procedures

*a. General.* The BC-376P has been designed to hold circuit tuning to a minimum. The unit should only be tuned when it will not fulfill its required function or when the SET CARRIER position on the meter can not be reached by adjusting the SET CARRIER knob. Make certain the battery is in good condition before attempting any of the following tuning procedures.

*b. Preliminary settings.*

(1) Set MODULATION switch to OFF position.

(2) Adjust SET CARRIER knob to approximately center of rotation.

(3) Set the power ON-OFF switch to ON.

*c. Oscillator tuning.*

(1) Set METER switch in OSCILLATOR position.

(2) Adjust tuning slug under OSCILLATOR tuning cover with a nonmetallic tuning tool. Turn slug until a peak reading is obtained on the meter.

**NOTE**

Slug may be turned in either direction, and may be screwed out of coil form if care is not exercised as the slug is turned.

*d. Carrier Tuning.*

(1) Set METER switch in CARRIER position.

(2) Adjust tuning slug under CARRIER tuning cover with a non-metallic tuning tool. Turn slug until a peak reading is obtained on the meter.

(3) Adjust tuning slug under OSCILLATOR tuning cover with a non-metallic tuning tool. Turn slug until a peak reading over 10 is obtained on the meter.

## Section IV. TESTING

### 5-9. Battery Testing

The meter should indicate not less than 17.5 volts when the METER switch is in the BATTERY position. If the voltage is below this, reconnect the battery following instructions in paragraph 4-3 or replace the battery following procedures in paragraph 2-4.

### 5-10. Oscillator Testing

*a.* Place the METER switch in the OSCILLATOR position.

*b.* The meter reading should be above 10; if it is not, refer the unit to general support maintenance.

## 5-11. Carrier Tuning

*a.* Place the METER switch in the CARRIER position.

*b.* The meter reading should be at SET CARRIER or be adjustable to the SET CARRIER position with the SET CARRIER knob. If the adjustment range does not include the SET CARRIER position, refer the unit to general support maintenance.

# CHAPTER 6

# FUNCTIONING OF EQUIPMENT

## 6-1. Mechanical Functions

All mechanical functions of the equipment should be self-evident from normal observation during operation of the equipment.

## 6-2. Electrical and Electronic Functions

*a.* Conventional Circuits (figs. 6-1 and 6-2).

(1) *Crystal Oscillator.* The oscillator Q1 is a third overtone crystal oscillator operating at 37.5 MHz. It provides the base frequency from which the carrier frequency is derived.

(2) *Audio Oscillator.* The audio oscillator consists of Q3, Q4, Q5, Q7, and Q11 in a Wein bridge configuration with a Zener diode, amplitude-stablized, output. Connected to the gate of field-effect transistor Q3 is a switched frequency-determining network that can produce audio frequencies of 400, 1300, and 3000 Hertz. All of the frequency-determining components have a one percent tolerance to limit the frequency variations due to component value changes. Modulator Q6 varies the collector voltage at the frequency doubler in the rf section at the audio rate selected by the MODULATION switch. This modulates the carrier signal.

(3) *Frequency Doubler.* The frequency doubler, Q2, is a standard rf amplifier with its output tuned to the Q1 second harmonic to produce a frequency output of 75 MHz. The 75 MHz output can be modulated with one of the three different audio frequencies applied through the doubler's modulated collector voltage. The 75 MHz output is inductively coupled to the antenna for transmission and directly coupled through the rf attenuator to the ATTENUATOR RF OUTPUT jack.

(4) *Rf Attenuator.* The rf attenuator provides a variable output. It utilizes a moveable plunger to change the output amplitude. The output of the attenuator is designed to be coupled into a fifty-ohm load impedance for optimum performance. This output is continuously variable from below 50 uv to 100,000 uv with calibrated values of 50, 100, 500, 1000, 1500, 5000, 10K, 50K and 100K uv. The calibrated points on the attenuator will be accurate only if the meter pointer is set at the SET CARRIER point.

(5) *Meter Amplifiers.* The meter amplifiers, Q8 and Q9, are both emitter followers and are used as isolators between the meter and the rf circuitry. The isolation prevents the meter from loading the rf circuits and either reducing the amplitude or detuning the circuit. In addition, carrier emitter follower Q9 functions as a diode detector for the heterodyne frequency metering function of the BC-376P.

(6) *Power Supply.* The regulated power supply is a Zener-controlled, series regulator (Q10), that supplies 17.5 volts to all circuits with the exception of the modulator and the rf circuits. The modulator uses the unregulated battery voltage, and power to the rf section is supplied through modulator Q6.

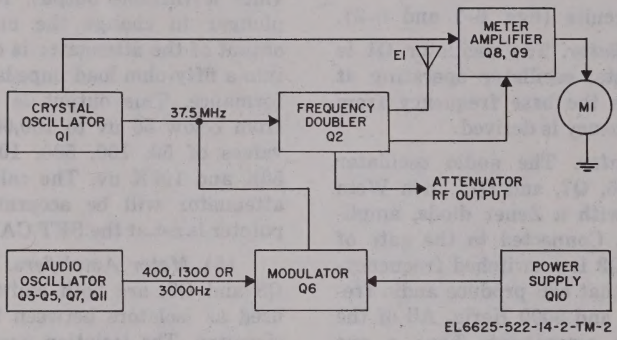



*Figure 6-1. Test Oscillator BC-376P, block diagram.*

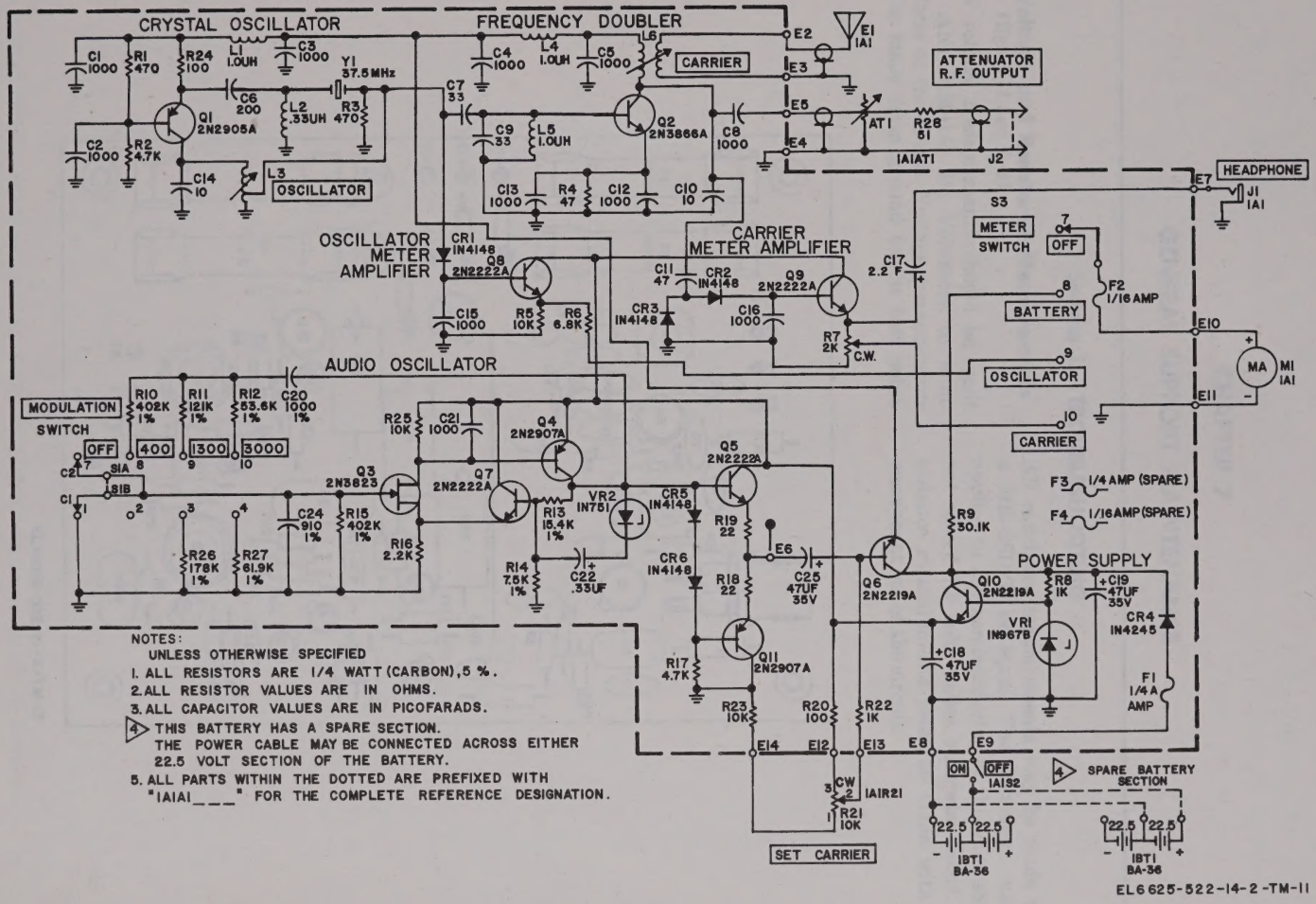
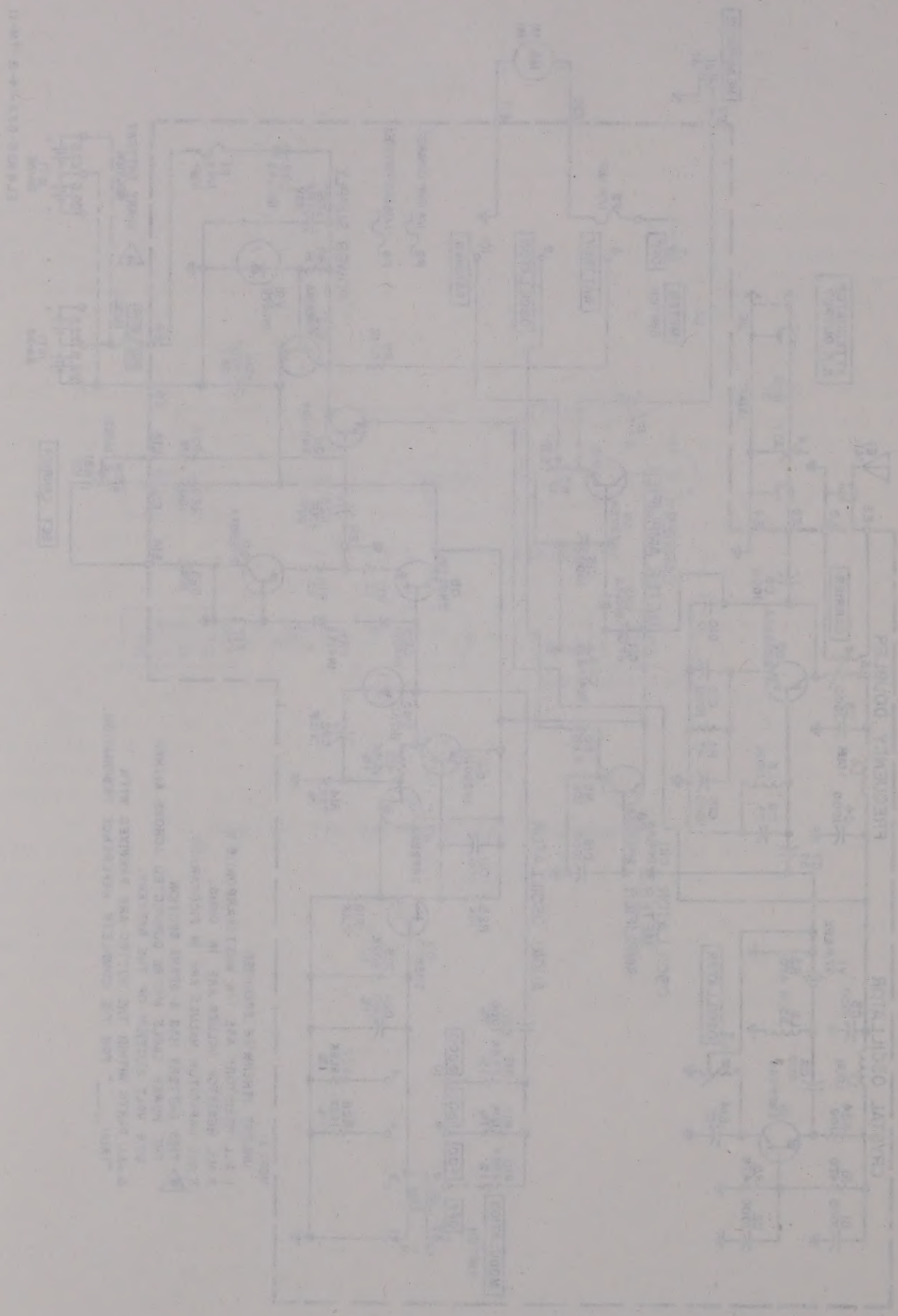

CRYSTAL OSCILLATOR
FREQUENCY DOUBLER
CARRIER
ATTENUATOR R.F. OUTPUT
OSCILLATOR METER AMPLIFIER
CARRIER METER AMPLIFIER
AUDIO OSCILLATOR
MODULATION SWITCH
POWER SUPPLY
HEADPHONE
METER SWITCH
BATTERY
OSCILLATOR
CARRIER
SET CARRIER
SPARE BATTERY SECTION
NOTES:
UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE 1/4 WATT (CARBON), 5 %.
2. ALL RESISTOR VALUES ARE IN OHMS.
3. ALL CAPACITOR VALUES ARE IN PICOFARADS.
4. THIS BATTERY HAS A SPARE SECTION. THE POWER CABLE MAY BE CONNECTED ACROSS EITHER 22.5 VOLT SECTION OF THE BATTERY.
5. ALL PARTS WITHIN THE DOTTED ARE PREFIXED WITH "1A1A1___" FOR THE COMPLETE REFERENCE DESIGNATION.
EL6625-522-14-2-TM-11

*Figure 6-2. Test Oscillator BC-376P, schematic diagram.*



# CHAPTER 7

# GENERAL SUPPORT MAINTENANCE

## Section I. TROUBLESHOOTING

### 7-1. Voltage and Resistance Measurements (figs. 7-1 and 7-2)

*a.* All voltage measurements should be made with a AN/URM-145 Dc Voltmeter to minimize effects on the circuit. Voltage measurements should be made from ground to the test point. All resistance measurements may be made with a ME-26D/U or equal. The maximum voltage applied to any semiconductor in this unit should not exceed 1.5 volts unless otherwise noted. Resistance measurements must be made with the component out of the circuit.

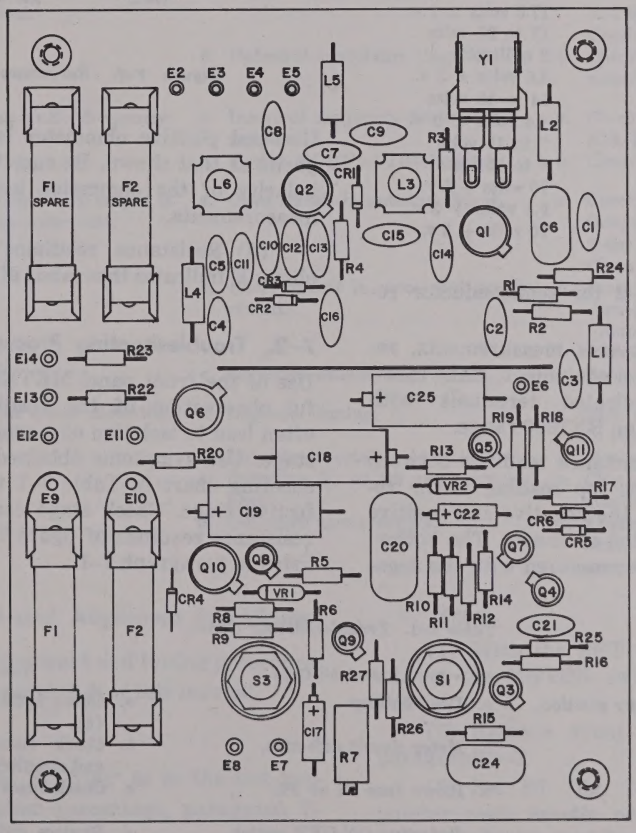



*Figure 7-1. Printed circuit board, component side.*

*b.* The voltage measurements shown in *c* below are representative. Voltage readings may be expected to vary from unit to unit.

*c.* Dc Voltage Requirements Chart.

| *Item* | *Point in Circuit* | *Voltage or Voltage Range* |
|---|---|---|
| 1 | Q1–Base | 6 to 17 volts |
| 2 | Q1–Emitter | 6 to 14 volts |
| 3 | Q1–Collector | .1 to 1.3 millivolts |
| 4 | CR1–Anode | 0 to 8 millivolts |
| 5 | Q8–Base | 0.16 to 6.0 volts |
| 6 | QB–Emitter | 0 to 5.0 volts |
| 7 | Q8–Collector | 16.9 volts ± 20% |
| 8 | Q2–Base | 0 volts |
| 9 | Q2–Emitter | 0.2 to 2.0 volts |
| 10 | Q2–Collector | 7.0 to 18 volts |
| 11 | E1 | 0 volts |
| 12 | Q9–Base | 3 to 20 volts |
| 13 | Q9–Emitter | 3 to 20 volts |
| 14 | S3–Pin #3 | .03 to 1.4 volts |
| 15 | Q6–Base | 8.0 to 18.0 volts |
| 16 | E9 | 17.5 to 22.5 volts |
| 17 | CR4–Anode | 17.5 to 22.5 volts |
| 18 | Q10–Base | 17.5 volts ± 1 v. |
| 19 | Q10–Collector | 17 to 22 volts |
| 20 | Q3–Gate | 2 millivolts |
| 21 | Q3–Source | 3.8 volts ± 2 v. |
| 22 | Q3–Drain | 14 to 18 volts |
| 23 | Q7–Base | 4.4 volts ± 2 v. |
| 24 | Q4–Collector | 7 to 15 volts |
| 25 | C22–(+) | 8 to 16 volts |
| 26 | Q5–Emitter | 10 volts + 3 v. |
| 27 | Q11–Base | 9.4 volts + 3 v. |
| 28 | Q11–Emitter | 10 volts + 3 v. |

*d.* Refer to figure 7–2 for semiconductor resistance measurements.

(1) To make resistance measurements, remove semiconductor from equipment. Make measurements between indicated terminals with multimeter ME–26D/U on RX1000 range.

(2) Where two resistance readings between terminals are given, the top reading is the resistance measured with the negative and positive ohmmeter leads connected as shown. The bottom reading is the resistance measured with the negative and positive ohmmeter leads connected opposite of that shown. Be sure to check the actual polarity of the ohmmeter leads before making measurements.

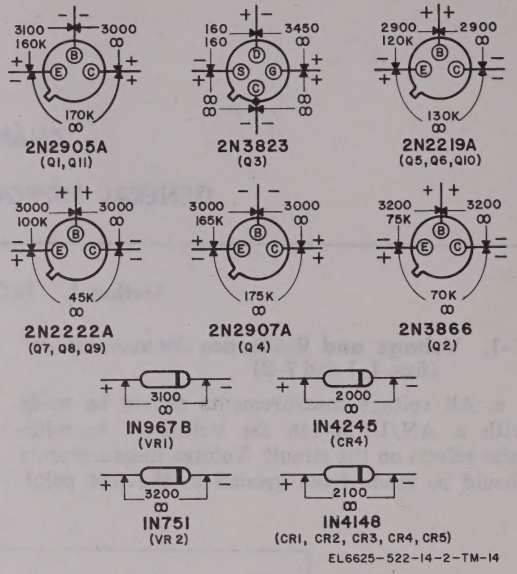



*Figure 7–2. Resistance readings.*

(3) Resistance readings are measured in ohms; K indicates thousands of ohms.

## 7–2. Troubleshooting Procedures

Use of the front panel METER switch and careful observation of the readings obtained will often lead to isolation of a trouble to a particular stage. Use symptoms obtained with the troubleshooting chart in Table 7–1 to pinpoint the defective stage. Check stage components by using resistance readings of figure 7–2 and/or voltages listed in paragraph 7–1.

*Table 7–1. Troubleshooting Chart.*

| *Symptom* | *Probable Cause* | *Corrective Action* |
|---|---|---|
| *1* Meter does not deflect in any position. | *a.* Dead battery. | *a.* Check battery (para. 3–4*a*(3) and (4). |
| | *b.* Meter circuit defective. | *b.* Check meter, associated switch, and circuitry. |
| | *c.* Blown fuse F1 or F2. | *c.* Check fuses F1 and F2. |
| | *d.* Defective ON-OFF switch. | *d.* Replace switch S2. |
| *2* Meter does not deflect in BATTERY position only. | *a.* Defective METER switch. | *a.* Replace METER switch. |
| | *b.* Defective R9. | *b.* Replace R9. |

*Table 7–1.*—Continued.

| *Symptom* | *Probable Cause* | *Corrective Action* |
|---|---|---|
| *3* Meter does not deflect in OSCILLATOR position only. | *a.* Defective oscillator meter amplifier stage. | *a.* Check Q8 and associated circuitry. |
| | *b.* Defective METER switch. | *b.* Check METER switch continuity. |
| *4* Meter does not deflect in OSCILLATOR or CARRIER position. | *a.* Rf oscillator malfunction. | *a.* Check crystal oscillator stage components. |
| | *b.* Modulator transistor failure. | *b.* Check modulator transistor Q6. |
| | *c.* Defective METER switch. | *c.* Check continuity of METER switch. |
| *5* Meter does not deflect in CARRIER position only. | *a.* Frequency doubler malfunction. | *a.* Check frequency doubler components, particularly the doubler transistor Q2. |
| | *b.* Defective carrier meter amplifier Q9. | *b.* Check carrier meter amplifier stage. |
| | *c.* Short circuit in antenna or attenuator circuits. | *c.* Inspect for shorts. Disconnect antenna and attenuator individually and note if condition changes. |
| | *d.* Defective METER switch. | *d.* Check METER switch by continuity. |
| *6* Meter deflects properly but no audio tone is heard in headset. | *a.* Audio oscillator failure. | *a.* Check components of Q3–Q5, Q7 and Q11 stages in audio oscillator. Check MODULATION switch. |
| | *b.* Defective modulator stage. | *b.* Check modulator transistor Q6 and associated components. |
| *7* Incorrect or missing audio frequency. | *a.* Incorrect frequency-determining resistors. | *a.* Check resistance of R10, R11, R12, R13, R14, R15, R26 or R27. |
| | *b.* Faulty MODULATION switch. | *b.* Clean or replace switch. |
| *8* Meter deflects properly but no output is observed on equipment under test. | *a.* Open circuit in antenna circuit. | *a.* Check connection to antenna. Check rf voltage at antenna (para. 7–6*e*) Check L6. Clean corroded antenna connection. |
| | *b.* Short circuit in associated output circuits. | *b.* Disconnect circuit at E5. There should be no continuity from E5 to ground at E4. Check coaxial cable from ATTENUATOR jack. |
| | *c.* Defective attenuator. | *c.* Replace attenuator (para 7–4*b*). |
| *9* Output is present but either distorted, low, or incorrect frequency. | *a.* Improper tuning. | *a.* Tune according to procedures given in paragraph 5–8*c* and *d*. |
| | *b.* Defective crystal. | *b.* Replace crystal. |
| | *c.* Defective Q1 or Q2 stage component. | *c.* Check components of Q1 and Q2 stages. |
| | *d.* Defective power supply. | *d.* Check transistor Q10 and Zener diode VR1. Check associated components. |

## 7–3. Adjustment and Alignment Procedures

Follow detailed adjustment and tuning procedures as outlined in paragraph 5–8 of this manual.

*a. Modulation.*

(1) Set up the BC–376P as in the test procedure for modulation percentage, paragraph 7–6*d*.

(2) Adjust the Set Carrier knob to give a modulation percentage of thirty to forty percent.

*b. Meter.*

(1) With the SET CARRIER knob adjusted, set the METER switch to CARRIER position.

(2) Remove front panel as outlined in paragraph 5–7.

(3) Set R7 (fig. 7–3) so that the meter pointer rests exactly over the SET CARRIER line on the meter (red line on meter face).

(4) Check adjustment with front panel in position and readjust as necessary.

*c. Attenuator.*

(1) With the meter adjusted as in paragraph *b* above, proceed with the ATTENUATOR alignment.

(2) Place ATTENUATOR in its fully closed (in) state.

(3) Loosen screw in locking collar.

(4) With ATTENUATOR output connected through a 50-ohm load to an rf voltmeter AN/URM-145, set the voltmeter reading at 0.1 volts by moving the end plug at rear of the attenuator. If necessary for optimum adjustment, very carefully remove plug and plunger assembly and bend coils as needed. Note that the reading can be varied greatly by both moving the plug in and out of the ATTENUATOR body and rotating the plug around its axis. Normally a very slight rotation is adequate for a very wide adjustment range.

## 7-4. Assembly, Disassembly, and Repair
(figs. 5-1, 7-3 and 7-4)

*a. General.*

When any repair is attempted on the BC-376P, great care should be exercised in removing and replacing parts, adjusting inductor coils, and returning of wires and components to their original place upon reassembly.

*b. Disassembly.*

(1) Reference paragraph 5-7 for removal of circuit board from case.

(2) Remove the ATTENUATOR by loosening the locking screw (fig. 7-3) which holds the plunger assembly in the body of the ATTENUATOR. Then loosen and remove the coaxial connection to the attenuator plug. Finally remove the three screws that attach the ATTENUATOR body to the front panel.

(3) Remove the meter by loosening the three meter mounting screws and two wires attached to the terminals on the rear of the meter. Care must be taken to prevent any, ac, dc, or voltage transient damage by keeping a shorting wire across the terminals when the meter is not connected. Also, reasonable care must be taken to prevent damaging the meter when it is not in its mounting.

*c. Rf coils.*

All of the coils included in the BC-376P are of the radio frequency type and all are checked by continuity measurements. If any choke coil should fail, replace it with one of equal inductance and Q. If one of the transmitter or oscillator coils should be damaged, a replacement must be obtained. Do not attempt to repair the damaged item.

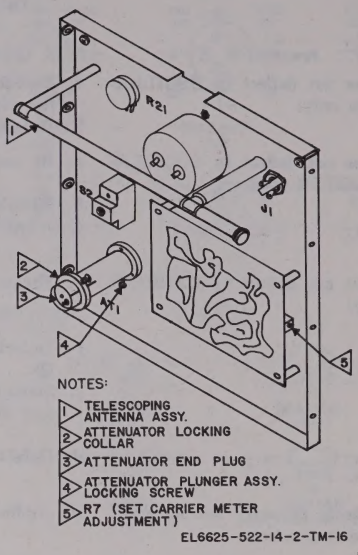



*Figure 7-3. Test Oscillator, BC-376P, front panel, rear view.*

*d. Attenuator.*

(1) The ATTENUATOR repair is limited to resoldering coils that break loose and replacing the 51-ohm matching resistor, R28 (fig. 6-2 and 7-1).

(2) When replacing R28, be very careful to use exactly the same size resistor with the same lead diameter, and to use the same or an exact duplicate of the insulation used around the resistor lead. Any variation of materials could substantially change the tuning point of the attenuator.

*e. Circuit Board (fig. 7-1).*

(1) The circuit board repair is limited to replacement of defective components. Never, except in emergency conditions, attempt any repair of the printed circuit conductors.

(2) To remove any component from the circuit board, remove all solder surrounding each lead with a low temperature desoldering tool.

(3) Gently lift the unsoldered lead off the board and straighten.

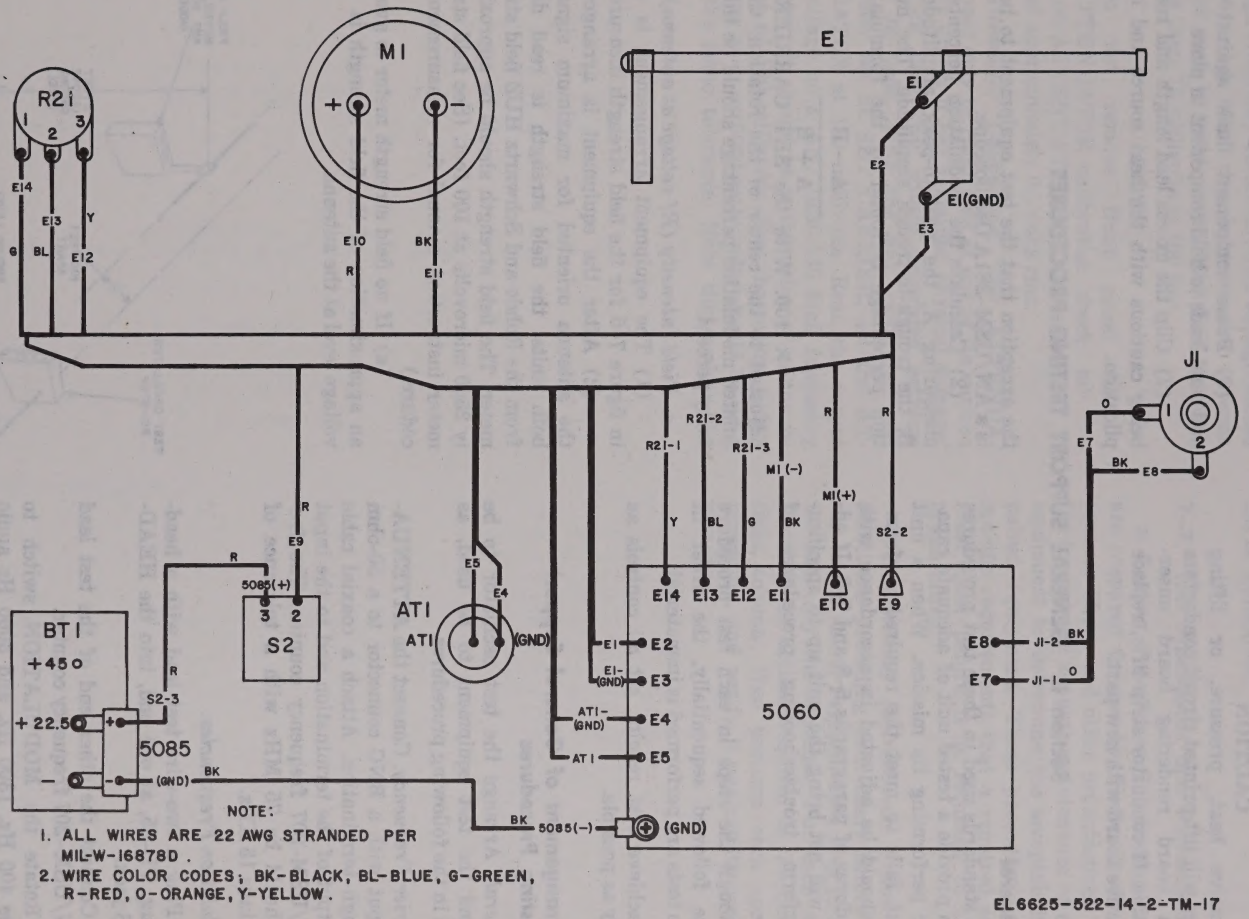



*Figure 7-4. Test Oscillator, BC-376P, wiring diagram.*

(4) Press lead through board toward component side until defective component drops out.

CAUTION

Excessive heat, pressure, or lifting forces will lift printed circuit conductors from board rendering board unserviceable. If conductor strip lifts, replace defective board with new part.

(5) Slowly press new component leads through board, taking care not to catch lead against conductor surrounding the hole.

(6) Press component flush against board and bend leads to hold component in place.

(7) Clip the excess lead length and resolder, being cautious with the heat source and its application.

## Section II. GENERAL SUPPORT TESTING PROCEDURES

### 7-5. General

*a.* The standards used in these test procedures are set to provide a tested unit of adequate capability for performing its mission. When a unit under test fails to meet the required performance, it should be adjusted in accordance with the procedures of paragraphs 5-8 and 7-3. If adjustment will not bring the unit up to specification, perform troubleshooting procedures of table 7-1.

*b.* Although the steps in each test procedure should be followed sequentially, the order in which the tests are performed is immaterial.

*c.* To achieve best results, set all controls as accurately as possible.

### 7-6. Arrangement of General Support Testing Procedures

*a. General.* Arrange the test oscillator to be tested, and the test equipment to be used, as described in the following procedures.

*b. Carrier Frequency.* Connect the ATTENUATOR output with a BNC connector to a 50-ohm feedthrough termination. Attach a coaxial cable to the output of the termination and to the input of a AN/USM-207 frequency counter. The frequency should be 75 MHz with a tolerance of plus or minus 15 KHz.

*c. Modulation Frequencies.*

(1) Plug a two-wire test lead with a headphone plug, PL-55, at one end, into the HEADPHONES jack.

(2) Connect the other end of the test lead to the AN/USM-207 frequency counter.

(3) Rotate the MODULATION switch to obtain the 400 Hz, 1300 Hz, and 3000 Hz audio frequencies. Tolerance of each of the frequencies is 5 percent.

*d. Modulation Percentage.*

(1) Connect BC-376P as in *b* above with the exception that the test equipment to be used is a AN/USM-281A Oscilloscope.

(2) Calculate the modulation percentage by measuring A, the peak-to-peak amplitude, and B, the trough-to-trough amplitude. The modulation percentage is found by the formula: $\% = \frac{A - B}{A + B} \times 100$. With the SET CARRIER knob adjusted to the center of the rotation, the calculated modulation percentage should be thirty to forty percent.

*e. Field Intensity (Rf voltage at antenna).*

(1) The equipment arrangement is shown in figure 7-5 for the field strength measurement.

(2) After the equipment is arranged and the antenna oriented for maximum signal for both units, the field strength is read directly from the Rohde and Schwartz HUZ field strength meter. The field strength should be approximately 2500 microvolts at 100 feet. (See field strength meter instruction manual for measurement procedure.)

(*a*) If no field strength meter is available, an approximation of the field strength is the rf voltage level at the antenna.

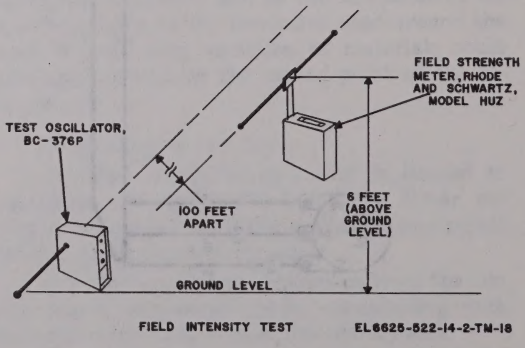



*Figure 7-5. Field intensity test.*

(*b*) Measure the rms voltage at the point the antenna leaves the case with an AN/URM–145 high frequency voltmeter. The voltage should be above 1.4 volts rms between the antenna and the case to yield a resultant field strength greater than .75 millivolts at 100 feet.

**NOTE**

Do not remove front panel for ATTENUATOR calibration check; adjust ATTENUATOR only if reading is not approximately 0.1 volts rms.

*f. Attenuator Calibration.* The ATTENUATOR need only be calibrated at one of its various settings unless it has sustained physical damage, in which case two widely separated settings should be used. With the unit calibrated and the meter set at SET CARRIER, set the ATTENUATOR at 100 millivolts. Read the output rms voltage on a AN/URM–145 high frequency voltmeter; it should be within plus or minus 20 percent of 100 millivolts. For the second point, a setting such as 5000 microvolts should be used with the same tolerance. Note that unless the SET CARRIER and the ATTENUATOR setting are adjusted very carefully, the tolerance may not be maintained.

## 7–7. Test Procedures and Performances

*a. Testing Procedures.* The testing procedures are prepared for use by Electronic Field Maintenance Shops and other organizations responsible for general support maintenance of electronic equipment to determine the acceptability of repaired equipment. These procedures set forth specific requirements that a repaired equipment must meet before it is returned to the using organization.

*b. Preliminary Instructions.* Follow the instructions preceding each chart before proceeding to the chart. Perform each step in sequence. Do not vary the sequence. For each step, perform all the actions required in the Control settings column; then perform each specific test procedure, and verify it against its performance standard.

### c. Physical Checks

| Step No. | Test Equipment | Control Settings / Equipment Under Test | Test Procedure | Performance Standard |
|---|---|---|---|---|
| 1 | None | Controls may be in any position. | *a.* Inspect case and chassis for damage, missing parts, and defective condition of paint. Note. Touchup painting is recommended in place of refinishing whenever practical; screwheads: binding posts, receptacles, and other plated parts will not be painted or polished with abrasives. | *a.* No damage evident or parts missing. External surfaces intended to be painted do not show bare metal. |
| | | | *b.* Inspect all controls and mechanical assemblies for loose or missing screws, bolts, and nuts. | *b.* Screws, bolts, and nuts will be tight with none missing. |
| | | | *c.* Inspect all connectors, sockets, receptacles, and fuseholders and meter for looseness, damage or missing parts. | *c.* No loose parts or damage. No missing parts. |
| 2 | None | Controls may be in any position. | *a.* Rotate all panel controls throughout their limits of travel. | *a.* Controls rotate freely without binding or excessive looseness. |
| | | | *b.* Inspect dial stops for damage or bending; check for proper operation. | *b.* Stops operate properly without evidence of damage. |
| | | | *c.* Operate all switches. | *c.* Switches operate properly. |

### d. Performance Test Chart.

| Test | Test Equipment | Test Equipment Setting | Control Settings / Unit Under Test | Performance Standard |
|---|---|---|---|---|
| 1 Carrier. | *a.* 50-ohm termination.<br>*b.* AN/USM-207.<br>*c.* Coax test lead. | Range 50–100 MHZ. | *a.* ON-OFF switch: ON.<br>*b.* METER switch: CARRIER position.<br>*c.* MODULATION switch: OFF.<br>*d.* Adjust meter to SET CARRIER mark. | Reading must fall between 74.985 and 75.015 MHz. |
| 2 Modulation Frequency. | *a.* AN/USM-207.<br>*b.* Test lead. | Range 0–10KHz. | *a.* ON-OFF switch: ON.<br>*b.* METER switch: CARRIER position.<br>*c.* MODULATION switch: as required.<br>*d.* Adjust meter to SET CARRIER mark. | Reading must fall as follows:<br>400 Hz: 380 to 420 Hz.<br>1300 Hz: 1235 to 1365 Hz.<br>3000 Hz: 2851 to 3150 Hz. |
| 3 Modulation percent. | *a.* 50-ohm termination.<br>*b.* Coax cable. | Sweep frequency adequate to distinguish peaks and troughs of audio modulation 0.1 milliseconds. | *a.* ON-OFF switch: ON.<br>*b.* METER switch: CARRIER position.<br>*c.* MODULATION switch: as required.<br>*d.* Adjust meter to SET CARRIER mark. | Modulation must be above 30% as calculated in paragraph 7-6*d*. |

| | | | | |
|---|---|---|---|---|
| 4 Field Intensity. | HUZ Rhode and Schwartz. | Range 10uv/m to 10,000 Mv/m. | *a.* ON-OFF switch: ON.<br>*b.* METER switch: CARRIER position.<br>*c.* Adjust meter to SET CARRIER mark.<br>*d.* Antenna: fully extended. | Field intensity must exceed 750 uv/m when surface is similar to actual test surface, ie., asphalt, concrete. |
| 5 Field Intensity (Use when field strength meter not available). | AN/URM–145 | Range 20 uv to 3 vrms | *a.* ON-OFF switch: ON.<br>*b.* METER switch: CARRIER position.<br>*c.* Adjust meter to SET CARRIER mark.<br>*d.* Antenna: fully extended. | Field intensity must exceed 750 uv/m when rms voltage exceeds 1.4 volts. |
| 6 Attenuator Calibration. | *a.* 50-ohm terminator.<br>*b.* Coaxial cable.<br>*c.* AN/URM–145. | Range 20 uv to 100 mv. | *a.* ON-OFF switch: ON.<br>*b.* METER switch: CARRIER position.<br>*c.* Adjust meter to SET CARRIER mark.<br>*d.* Antenna: fully extended. | Meter reads approximately 0.1 volts with attenuator fully closed. |

# APPENDIX A

## REFERENCES

The following publications contain information applicable to the operation and maintenance of Test Oscillator, BC–376P.

| | |
|---|---|
| DA Pam 310–4 | Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders. |
| DA Pam 310–7 | Index of Modification Work Orders. |
| SB 38–100 | Preservation, Packaging and Packing Materials, Supplies, and Equipment use by the Army. |
| TB 746–10 | Field Instructions for Painting and Preserving Electronics Command Equipment. |
| TB 9–6625–1060–50 | Calibration procedure for Electronic counters CP–769/U (Transistor Specialities, models 361 and 361R), CP–768/G, AN/USM–207 (CMC models 880A and 884A) and Hewlett-Packard model 5221B. |
| TM 11–6625–200–15 | Operator and Organizational DS, GS, and Depot Maintenance Manual: Multimeter ME–26A/U, ME–26B/U, ME–26C/U, and ME–26D/U. |
| TM 11–6625–203–12 | Operator and Organizational Maintenance, Multimeter AN/URM–105 Including Multimeter ME–77/U. |
| TM 11–6625–524–14 | Operator, Organizational Maintenance Manual, Voltmeter Electronic AN/URM–145. |
| TM 11–6625–1703–15 | Operator, Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Oscilloscope AN/USM–281A. |
| TM 11–6625–522–24P–2 | Organizational, Direct Support, General Support, and Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools), Test Oscillator, BC–376P. |
| TM 38–750 | The Army Maintenance Management System (TAMMS). |

# APPENDIX B

# MAINTENANCE ALLOCATION

## Section I. INTRODUCTION

### B-1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

### B-2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

*a. Inspect.* To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

*b. Test.* To verify serviceability and to detect incipient failure of measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

*c. Service.* Operations required periodically to keep an item in proper operating condition, i.e., to clean, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

*d. Adjust.* Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

*e. Align.* To adjust specified variable elements of an item to about optimum or desired performance.

*f. Calibrate.* To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used to precision measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

*g. Install.* The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

*h. Replace.* The act of substituting a serviceable like-type part, subassembly, module (component or assembly) in a manner to allow the proper functioning of an equipment/system.

*i. Repair.* The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/assembly, end item or system.

*j. Overhaul.* That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DMWR) in pertinent technical manuals. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

*k. Rebuild.* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment/components.

*l. Symbols.* The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

## B-3. Explanation of Format

*a. Group Number.* Column 1 lists group numbers, the purpose of which is to match components, assemblies, subassemblies and modules with the next higher assembly.

*b. Functional Group.* Column 2 lists the next higher assembly group and the item names of components, assemblies, subassemblies and modules within the group for which maintenance is authorized.

*c. Maintenance Functions.* Column 3 lists the twelve maintenance functions defined in −2 above. Each maintenance function required for an item is specified by the symbol among those listed in *d* below which indicates the level responsible for the required maintenance. Under this symbol is listed an appropriate work measurement time value determined as indicated in *e* below.

*d. Use of Symbols.* The following symbols are used to prescribe work function responsibility:

C—Operator/Crew
O—Organization
F—Direct Support
H—General Support
D—Depot

## B-4. Explanation of Format of Table I and Test Equipment Requirements

The columns in table I follows:

*a. Tools and Equipment.* The numbers in this column coincide with the numbers used in the tools and equipment column of the maintenance allocation chart. The numbers indicate the applicable tool for the maintenance function.

*b. Maintenance Category.* The codes in this column indicate the maintenance category normally allocated the facility.

*c. Nomenclature.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

*d. Federal Stock Number.* This column lists the Federal stock number of the specific tool or test equipment.

*e. Tool Number.* Not used.

SECTION II - MAINTENANCE ALLOCATION CHART

| (1) GROUP NUMBER | (2) FUNCTIONAL GROUP COMPONENT ASSEMBLY NOMENCLATURE | (3) MAINTENANCE FUNCTIONS | | | | | | | | | | | (4) TOOLS AND EQUIPMENT | (5) REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | INSPECT | TEST | SERVICE | ADJUST | ALIGN | CALIBRATE | INSTALL | REPLACE | REPAIR | OVERHAUL | REBUILD | | |
| | TEST OSCILLATOR | 0 | | 0 | | | | | | | | | | Knobs, controls, and antenna extension. |
| | BC-376P | | 0 | | | | | | | | | | 1 | Observe meter movement |
| | | | | | 0 | | | | | | | | 2 | Oscillator and carrier tuning. |
| | | | | | | | | | | 0 | | | 1, 2 | By replacing the battery fuse. |
| | | | | | H | | | | | | | | 3 thru 10 | |
| | | | | | | | | | | H | | | 3 thru 10 | By replacing printed circuit board, switches. |
| | | | | | | | | | | | D | | 3 thru 10 | |

## SECTION III - TOOL AND TEST EQUIPMENT REQUIREMENTS

| TOOLS AND EQUIPMENT | MAINTENANCE CATEGORY | NOMENCLATURE | | FEDERAL STOCK NUMBER | TOOL NUMBER |
|---|---|---|---|---|---|
| 1 | O | AN/URM-105C | Multimeter | 6625-999-6282 | |
| 2 | O | TK-101/G | Tool Kit, Electronic Equip | 5180-064-5178 | |
| 3 | H, D | TK-100/G | Tool Kit, Electronic Equip | 5180-605-0079 | |
| 4 | H, D | AN/USM-207A | Counter Electronic | 6625-044-3228 | |
| 5 | H, D | AN/USM-281A | Oscilloscope | 6625-228-2201 | |
| 6 | H, D | AN/URM-145 | Voltmeter, Electronic | 6625-973-3986 | |
| 7 | H, D | ME-26D/U | Multimeter | 6625-913-9781 | |
| 8 | H, D | DA-471/U | 50 ohm Feedthru | 6625-935-0093 | |
| 9 | H, D | RG-58C/U | (4 feet) | 6145-542-6092 | |
| 10 | H, D | UG-88E/U | (2 each) | 5935-823-0487 | |

By Order of the Secretary of the Army:

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*Chief of Staff*

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